mounted, and/or other factors readily apparent to those skilled in the art. In general, however, the area of illumination **121** should be spaced a sufficient distance forward of the nozzle that it is readily visible by an operator of the cleaner. By way of example but not limitation, in this embodiment, the light area **121** starts at a distance of about three to four in. from the front **13** of the cleaner **1** and ends at a distance of about 10 to 11 in. from the front of the cleaner.

In the embodiment of FIGS. **8-10**, the two sensor-responsive LED devices **77** are mounted outboard of the illumination LED devices **75** toward opposite sides **17** of the nozzle **3**. Each sensor-responsive LED device **77** is spaced a distance D**3** (FIG. **9**) from the central longitudinal axis **109** of the cleaner. By way of example, distance D**3** may be about 4.5 to 5.5 in. Each of the two sensor-responsive LED devices **77** generates a conical beam having a conical angle of divergence of about 20 to 30 degrees (e.g., about 25 degrees), and the central axis **105** of the beam is generally parallel with the front-to-back axis **109** of the cleaner (i.e., the yaw angle A is about zero degrees). Further, the beam is angled downward at a pitch angle B of about 15 to 25 degrees (e.g., about 20 degrees). As thus configured and arranged, the regions of light **77**R projected onto the floor by the sensor-responsive LED devices **77** are located on opposite sides of the central area **121** illuminated by the illumination LED devices **75** (see FIG. **8**). As noted previously, the sensor-responsive LED devices **77** and illumination LED devices **75** emit light of different colors so that it will be readily apparent to the user of the vacuum cleaner that a condition has been sensed by the condition sensing system. The side regions **77**R may be entirely separate from the central area, or they may partially overlap the central area (as shown in FIG. **8**), or they may completely overlap the central area. Because different colors are used, even a complete overlap will produce a different color at the overlap to signal a condition sensed by the sensing system. It will also be understood that the area or areas illuminated by the sensor-responsive LED devices **77** may be at locations other than as shown in FIG. **8**. For example, the regions illuminated by the sensor-responsive LED devices **77** may be at only one side of the central area **121**, or in front of the central area **121**, or behind the central area **121**. The only criterion is that the illuminated region or regions **77**R be on the floor and readily visible to the user of the cleaner. In this regard, each region of light **77**R illuminated by a sensor-responsive LED device **77** may have front-to-back dimension **145** (FIG. **8**) in the range of about four to five in. and a side-to-side dimension **147** in the range of about 1.5 to 2.5 in.

FIG. **12** illustrates an exemplary electrical circuit for the sensing system **5**, the sensor responsive light system **7**, and the illumination system **9**. In this particular configuration, the sensor responsive LED devices **77** are deactivated when the handle **51** of the vacuum cleaner is in an upright position and/or when the agitator **41** is off. Other circuits are possible.

In operation, the vacuum cleaner **1** is used to remove dirt from a floor. As the cleaner is pushed across the floor, the agitator **41** sweeps dirt up into the cleaner where it is suctioned along the flow path **45** toward a dirt collector on the cleaner. The passage of dirt along the flow passage **45** is sensed by the dirt sensor **65**, which sends a signal to illuminate the sensor-responsive LED devices **75**. The beams emitted by these devices **77** illuminate regions **77**R on the floor which are readily visible to the user to indicate the presence of dirt being suctioned from the floor. If the vacuum cleaner is equipped with an illumination system **9**, as described above, the region or regions **77**R illuminated by the sensor-responsive beam(s) are preferably of a different color so that they are readily distinguishable from the regions **75**R illuminated by the illumination beams. When the amount of dirt in the air moving along the flow path **45** decreases to a threshold level at which the sensor **65** no longer detects dirt, the sensor sends a signal to turn off the sensor-responsive LED devices **77**, indicating to the operator that the particular floor area being vacuumed is clean.

As noted previously, the sensing system **5** described above may be used to sense conditions other than dirt on the floor. Regardless of the condition being sensed, the sensor-responsive LED devices **77** function in the same manner, that is, to illuminate one or more regions **77**R on the floor to clearly indicate to the user the presence or absence of the condition being sensed.

FIG. **13** shows a second embodiment of a vacuum cleaner of this invention, generally designated **301**. This embodiment is similar to the first embodiment except that the four illumination LED devices **305** and two sensor-responsive LED devices **307** are spaced at equal intervals D**7** along an axis **315** extending generally transversely (side-to-side) with respect to the vacuum cleaner. Further, the central axes **321** of the light beams emitted by the LED devices **305**, **307** are all generally parallel to the central front-to-back axis **325** of the cleaner. The pitch angles of the LED devices **305**, **307** may be as described in the previous embodiment. The spacing (e.g., D**7**) between the LED devices **305**, **307** is desirably such that the beams as projected onto the floor overlap to some extent. As in the previous embodiment, the color of light emitted by the two sensor-responsive LED devices **307** is preferably different from the color of light emitted by the illumination LED devices **305**. The LED devices **305**, **307** may be arranged in other ways without departing from the scope of this invention.

It will be understood that the specific arrangements, dimensions and configurations described above are exemplary only. The illumination system **9** may use illumination devices other than LED devices **75** (e.g., incandescent lamps), and the arrangement and configuration of such devices may vary. Further, the illumination system **9** may be eliminated entirely without departing from the scope of this invention. Similarly, the sensing system **5** may take other forms, and the sensor-responsive light system **7** may be configured differently without departing from the scope of this invention.

When introducing elements of the present invention or the preferred embodiments(s) thereof, the articles "a", "an", "the" and "said" are intended to mean that there are one or more of the elements. The terms "comprising", "including" and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawing[s] shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A vacuum cleaner comprising:

a suction head configured to draw air from a surface as the suction head is moved over a working area of the surface,

a sensing system for sensing a presence of dirt in the air drawn from the surface by the suction head, and

a sensor-responsive light system on the suction head and positioned to project light away from the suction head and onto a first region of the working area forward of the suction head based on the presence of dirt in the air drawn by the suction head.